

Table S1. Land use transfer matrix in YRD region during 2000-2005 (km²)

| 2000-2005 | Cultivated land | Forest | Grass land | Water area | Built-up area | Unused land | Original area |
|---------------------------|-----------------|-----------|------------|------------|---------------|-------------|---------------|
| Cultivated land | 178154.38 | 341.28 | 16.44 | 712.57 | 3642.68 | 0.89 | 182868.24 |
| Forest | 365.88 | 99716.79 | 117.92 | 56.38 | 235.76 | 3.36 | 100496.09 |
| Grassland | 59.73 | 134.48 | 11290.16 | 25.26 | 32.54 | 2.07 | 11544.24 |
| Water area | 316.03 | 20.75 | 17.3 | 23747.02 | 100.69 | 0.08 | 24201.87 |
| Built-up area | 181.29 | 13.76 | 1.15 | 18.37 | 30823.46 | 0.02 | 31038.05 |
| Unused land | 0.13 | 2.11 | 1.65 | 1.54 | 2.8 | 55.11 | 63.34 |
| Area after transformation | 179077.44 | 100229.17 | 11444.62 | 24561.14 | 34837.93 | 61.53 | - |

Table S2. Land use transfer matrix in YRD region during 2005-2010 (km²)

| 2005-2010 | Cultivated land | Forest | Grass land | Water area | Built-up area | Unused land | Original area |
|---------------------------|-----------------|----------|------------|------------|---------------|-------------|---------------|
| Cultivated land | 156708.56 | 5148.04 | 554.2 | 2510.27 | 14080.55 | 66.14 | 179067.76 |
| Forest | 5313.8 | 92641.94 | 1179.76 | 339.23 | 694.63 | 46.5 | 100215.86 |
| Grassland | 570.94 | 1170.67 | 9211.5 | 310.61 | 135.15 | 44.38 | 11443.25 |
| Water area | 1917.6 | 263.07 | 98.41 | 21740.55 | 524.62 | 1.81 | 24546.06 |
| Built-up area | 7411.68 | 310.36 | 67.18 | 454.86 | 26551.89 | 37.57 | 34833.54 |
| Unused land | 2.48 | 14.67 | 1.33 | 0.88 | 2.92 | 39.21 | 61.49 |
| Area after transformation | 171925.06 | 99548.75 | 11112.38 | 25356.4 | 41989.76 | 235.61 | - |

Table S3. Land use transfer matrix in YRD region during 2010-2015 (km²)

| 2010-2015 | Cultivated land | Forest | Grass land | Water area | Built-up area | Unused land | Original area |
|---------------------------|-----------------|----------|------------|------------|---------------|-------------|---------------|
| Cultivated land | 166307.54 | 214.55 | 12.85 | 738.87 | 4647.53 | 14.27 | 171935.61 |
| Forest | 68.1 | 99151.12 | 4.25 | 25.72 | 301.26 | 6.94 | 99557.39 |
| Grassland | 23.42 | 13.52 | 10971.21 | 23.81 | 80 | 2.92 | 11114.88 |
| Water area | 287.2 | 1.4 | 54.09 | 24824.46 | 210.35 | 1.18 | 25378.68 |
| Built-up area | 493.17 | 32.76 | 12.87 | 153.17 | 41298.11 | 8.59 | 41998.67 |
| Unused land | 9.12 | 0 | 0 | 1.15 | 14.4 | 211.02 | 235.69 |
| Area after transformation | 167188.55 | 99413.35 | 11055.27 | 25767.18 | 46551.65 | 244.92 | - |

Table S4. Land use transfer matrix in YRD region during 2015-2018 (km²)

| 2015-2018 | Cultivated land | Forest | Grass land | Water area | Built-up area | Unused land | Original area |
|------------------------------|--------------------|----------|---------------|---------------|------------------|----------------|------------------|
| Cultivated land | 160390.41 | 1242.64 | 215.46 | 950.01 | 4386.96 | 12.7 | 167198.18 |
| Forest | 1360.77 | 97097.85 | 344.95 | 85.72 | 495.3 | 4.92 | 99389.51 |
| Grassland | 230.98 | 282.85 | 10355.84 | 111.25 | 71.77 | 0.92 | 11053.61 |
| Water area | 1347.84 | 90.9 | 248.1 | 23902.02 | 296.42 | 185.45 | 26070.73 |
| Built-up area | 3642.77 | 198.67 | 109.25 | 653.04 | 42022.95 | 6.17 | 46632.85 |
| Unused land | 60.48 | 5.55 | 23.55 | 14.23 | 29.12 | 111.99 | 244.92 |
| Area after transformation | 167033.25 | 98918.46 | 11297.15 | 25716.27 | 47302.52 | 322.15 | - |